In the Claims:

1. (Currently Amended) A cryptographic device comprising:

an input stage receiving an input data block that is X bits in length and a key data block comprising a plurality of sub-key data blocks, said input stage adding the X bits of the input data block with a first sub-key data block to generate a summed signal that is X bits in length, and then dividing the summed signal into N ~~and generating a plurality of~~ first signals ~~therefrom~~ that are in parallel, where each first signal is n bits in length so that n * N = X;

an intermediate stage connected to said input stage and comprising

a plurality of substitution units operating in parallel, each substituting data within a respective first signal, and

a diffuser connected to said plurality of substitution units for mixing data to generate a diffused signal, said diffuser comprising at least one shift register and at least one look-up table associated therewith; and

an output stage connected to said intermediate stage for repetitively looping back the diffused signal to said input stage for combination with a next sub-key data block.

2. (Original) A cryptographic device according to Claim 1 wherein the looping back is repeated a predetermined

number of times; and wherein said output stage provides an output signal for the cryptographic device after the repetitively looping back is complete.

3. (Original) A cryptographic device according to Claim 2 wherein the output signal is further combined with a final sub-key data block.

4. (Original) A cryptographic device according to Claim 1 wherein each substitution unit performs a non-linear substitution based upon at least one look-up table.

Claim 5 (Cancelled).

6. (Previously Presented) A cryptographic device according to Claim 1 wherein said at least one shift register comprises a plurality of shift registers and said at least one look-up table comprises a plurality of look-up tables associated therewith.

7. (Original) A cryptographic device according to Claim 1 wherein said output stage performs a row-shift operation on the diffused output signal before being looped back to said input stage.

8. (Original) A cryptographic device according to Claim 1 wherein said output stage performs a column-mix operation on the diffused output signal being looped back to said input

stage.

9. (Original) A cryptographic device according to Claim 1 wherein said output stage comprises a counter for counting a number of times the diffused output signal is looped back to said input stage.

10. (Currently Amended) A communication system comprising:

a key scheduler providing a key data block comprising a plurality of sub-key data blocks; and

a cryptographic device connected to said key scheduler and comprising

an input stage receiving an input data block that is X bits in length and the key data block, said input stage adding the X bits of the input data block with a first sub-key data block to generate a summed signal that is X bits in length, and then dividing the summed signal into N ~~and generating a plurality of~~ first signals ~~therefrom~~ that are in parallel, where each first signal is n bits in length so that n * N = X;

an intermediate stage connected to said input stage and comprising

a plurality of substitution units operating in parallel, each substituting data within a respective first signal, and

a diffuser connected to said plurality of substitution units for mixing data to

generate a diffused signal, said diffuser comprising at least one shift register and at least one look-up table associated therewith, and

an output stage connected to said intermediate stage for repetitively looping back the diffused signal to said input stage for combination with a next sub-key data block, said output stage providing an output signal for the cryptographic device after the repetitively looping back is complete.

11. (Original) A communication system according to Claim 10 wherein the output signal is further combined with a final sub-key data block.

12. (Original) A communication system according to Claim 10 wherein each substitution unit performs a non-linear substitution based upon at least one look-up table.

Claim 13 (Cancelled).

14. (Previously Presented) A communication system according to Claim 10 wherein said at least one shift register comprises a plurality of shift registers and said at least one look-up table comprises a plurality of look-up tables associated therewith.

15. (Original) A communication system according to

Claim 10 wherein said output stage performs a row-shift operation on the diffused output signal before being looped back to said input stage.

16. (Original) A communication system according to Claim 10 wherein said output stage performs a column-mix operation on the diffused output signal being looped back to said input stage.

17. (Original) A communication system according to Claim 10 wherein said output stage comprises a counter for counting a number of times the diffused output signal is looped back to said input stage.

18. (Currently Amended) A method for converting an input data block that is X bits in length and a key data block comprising a plurality of sub-key data blocks into an output signal in a cryptographic device, the method comprising:

~~generating a plurality of first signals that are in parallel based upon the input data block and a key data block comprising a plurality of sub-key data blocks;~~

adding the X bits of the input data block with a first sub-key data block to generate a summed signal that is X bits in length, and then dividing the summed signal into N first signals that are in parallel, where each first signal is n bits in length so that n * N = X;

substituting data within each first signal using a respective substitution unit, with the substitution units

operating in parallel to one another;

mixing data to generate a diffused signal using a diffuser connected to the respective substitution units, the diffuser comprising at least one shift register and at least one look-up table associated therewith; and

repetitively looping back the diffused signal for combination with a next sub-key data block before repeating the substituting and mixing.

19. (Original) A method according to Claim 18 wherein the looping back is repeated a predetermined number of times; and further comprising providing an output signal for the cryptographic device after the repetitively looping back is complete.

20. (Original) A method according to Claim 19 further comprising combining the output signal with a final sub-key data block.

21. (Original) A method according to Claim 18 wherein each substitution unit performs a non-linear substitution based upon at least one look-up table.

Claim 22 (Cancelled).

23. (Previously Presented) A method according to Claim 18 wherein the at least one shift register comprises a plurality of shift registers and the at least one look-up table comprises a

plurality of look-up tables associated therewith.

24. (Original) A method according to Claim 18 further comprising performing a row-shift operation on the diffused output signal before being looped back.

25. (Original) A method according to Claim 18 further comprising performing a column-mix operation on the diffused output signal being looped back.

26. (Original) A method according to Claim 18 further comprising counting a number of times the diffused output signal is looped back.